The Department of Medical Technology at the John A. Burns School of Medicine, University of Hawai'i at Manoa

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In 1993, the Medical School Hotline was founded by Satoru Izutsu PhD (former vice-dean UH JABSOM), it is a monthly column from the University of Hawai'i John A. Burns School of Medicine and is edited by Kathleen Kihmm Connolly PhD; HJMPH Contributing Editor.

Medical laboratory tests performed on blood and other bodily fluids are vital in both the diagnosis and treatment of patients. According to a report by the American Clinical Laboratory Association, more than ten billion lab tests are performed and interpreted by lab professionals across the United States annually, and more than 70% of medical decisions are based on diagnostic test results.[1] Professionals who perform these diagnostic procedures are Medical Laboratory Scientists (MLS) with bachelor's degree, and Medical Laboratory Technicians (MLT) with associate's degree; they are both nationally certified. The duties of MLSs and MLTs include the collection and processing of specimens, analyzing the specimens using sophisticated instruments, verifying results, and reporting the findings to clinicians. MLSs have additional responsibilities of assuring compliance with regulations (eg, CLIA 88) and accreditation standards, supervising others, and managing the lab operations. They are employed by hospitals, independent labs, physician's office labs, reference labs, molecular pathology labs, and others.

The University of Hawai'i at Manoa (UHM) has been graduating medical technologists (now called MLS) since 1946, just a few years after the American Society of Clinical Pathologists began administering the national certification examinations. This was made possible through the efforts of faculty such as Dr. Oswald A. Bushnell (microbiologist and well-known Hawaiiana author) and Dr. Eric Fennel of The Clinic (present day Straub). In 1967, the Division of Medical Technology became a unit, and later formed into the Department of Medical Technology (DMT), within the John A. Burns School of Medicine (JABSOM), UHM. The first medical technologist faculty member was Grace Oishi (Kagawa), who taught in the hematology lab for many years. The program grew under Louise Wulff and Patricia Taylor.

Today, the DMT is staffed by faculty members Dr. Ji Sook Ha, Sheri Gon, Ray Yamaguchi, and Dick Teshima, with Secretary Marsha Kato. Dr. Reginald Ho at Straub Medical Center provides hematology lectures as an adjunct faculty member. Dr. Kenton Kramer and Dr. Willi Gosnell from the JABSOM Department of Tropical Medicine and Medical Microbiology teach the parasitology course.

The program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS), while maintaining affiliations with Kaiser Permanente Medical Center (Celeste Matsuo), Tripler Army Medical Center (SSG Jamar Williams), Diagnostic Laboratory Services (Stacia Takeuchi and Jodie Kawamoto), Clinical Laboratories of Hawai'i (Judith Yamada and Alberta Corpuz), Kuakini Medical Center (Ryan Tsuji), and the Adventist Health Castle (Garth Weitzel). These clinical affiliates provide the clinical rotations for graduates which are required in the curriculum.

JABSOM DMT graduates have excellent track records. Student pass rates on the national certification exams are nearly 100%, and average scores are well above national average in all sub-disciplines. Almost all graduates have their employment secured even before they complete the clinical training. These benchmarks are important in maintaining accreditation with NAACLS.

DMT also has international connections. Every year, a group of medical technology students from Niigata, Japan, visits the Department on a week-long student/faculty exchange. Japanese students join JABSOM students in classes conducted in English. They return to Niigata with renewed energy and interest in their career choice. Interacting with the Japanese students is an eye opening experience for our students as well. As part of the JABSOM mission, DMT students are training to be future healthcare professionals, establishing connections and understanding with colleagues from the Asia-Pacific region.

Curriculum

The baccalaureate curriculum in medical technology is based on a 2+2 career-pathway model by collaborating with the Kapi'olani Community College's (KCC) MLT program. Dr. Shepherd Maingano, director of KCC's program, is the main pipeline of students entering the JABSOM MLS program. Joining the KCC MLT graduates are a few MLTs who come from the mainland or are military trained. This pathway enables MLTs to complete the baccalaureate requirements in just two more years.

Recently, a new admission pathway for students who already have earned bachelor's degrees was established. This pathway facilitates these highly motivated students with added expertise

in related fields to become certified MLSs, so that they can enter the healthcare arena. As a result, the program has doubled its enrollment.

As a bachelor of science degree program, students in medical technology must clear the foundational courses such as general biology, cell & molecular biology, general/organic chemistry, math, immunology, and the general education courses. When admitted to the major, students study the lab methods and clinical correlation in hematology, hemostasis (coagulation), clinical biochemistry, immunohematology (transfusion service), and clinical microbiology (bacteriology, virology, mycology, parasitology). Students also learn the basics of lab management.

Clinical training at one or more of our local clinical affiliates follows graduation. Here, graduates obtain hands-on experience in all areas of the lab so that they attain the knowledge, skills and professionalism in medical technology. Completion of clinical training qualifies graduates to challenge the national certification exam.

Medical Laboratory and Workforce Issue

The medical laboratory has traditionally been a behind-the-scene player on the healthcare stage, but in reality it is one of the principle actors. For example, when a trauma case arrives, the blood bank section goes into action with MLS's testing and preparing various types of blood products for transfusions. A hematology MLS operating a microscope may be the first person to recognize the leukemia cell on a child's blood smear. Today, extremely sophisticated instruments such as the MALDI-TOF, HPLC/MS/MS, and others fill labs, necessitating the presence of qualified MLSs.

However, medical labs across the nation have been struggling with serious workforce shortage, partly because of its relatively unknown status; there is a lack of recognition for and awareness of this profession compared to other healthcare workers such as doctors or nurses. Hawai'i is no exception. According to the US Bureau of Labor Statistics, employment of medical lab professionals is expected to grow by 13% between 2010 and 2020. Due to many issues, such as closures of educational and training programs, retiring "boomer" generation, and difficulties with retention, MLS/MLT programs are producing only about a third of lab professionals needed.[2,3]

The Future

Medical laboratories today are very different from labs of just a few decades ago. Shaking the Folin-Wu tubes for blood sugar assay is an ancient story; the classic "bleeding time" test is phasing out. Automation and robotics have now become the norm, especially in high volume labs and labs that handle hazardous or highly infectious materials. Modern instruments process samples efficiently and tirelessly, thus improving overall productivity.

Using modern instrumentations, instead of their positions being taken away by automations, MLTs and MLSs are busier than ever. Freed from performing inefficient manual procedures, they now spend much time in calibrating/maintaining the instruments, verifying results, and validating new procedures. Increasingly, MLSs serve as consultants to clinicians so that the most meaningful tests are selected and the results are properly interpreted. As more Point-of-Care-Testing (POCT) devices are utilized by healthcare providers right at the patient's "bedside," MLSs must train POCT operators in various settings.

Many diseases can be diagnosed at the genetic level today. Although these tests are available only through specialized labs, and are costly and highly complex to perform, they generate precise information that can lead to "personalized" medical care. How to effectively integrate artificial intelligence (AI) in the medical labs is an exciting challenge for the next generation of medical technologists.

Developments in the field of microbiology are especially phenomenal. With the molecular technologies available today, pathogenic organisms can be quickly identified without having to wait for the bacteria to grow on culture media which can take days or even weeks. Specialized microbiology labs are in need of lab professionals who have advanced knowledge in the field. In response, JABSOM DMT is initializing a clinical microbiology curriculum for students majoring in microbiology. Planned to start in 2019, this program is a collaboration with the Department of Microbiology in the UHM College of Natural Sciences, the State Department of Health, and JABSOM's affiliate clinical labs.

The Department of Medical Technology at JABSOM, the only accredited program in medical laboratory science in Hawai'i, strives to remain at the forefront of producing highly qualified lab professionals for Hawai'i and the Pacific region.

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